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1 SHEET

COMPLETE SPECIFICATION

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Fig. 1

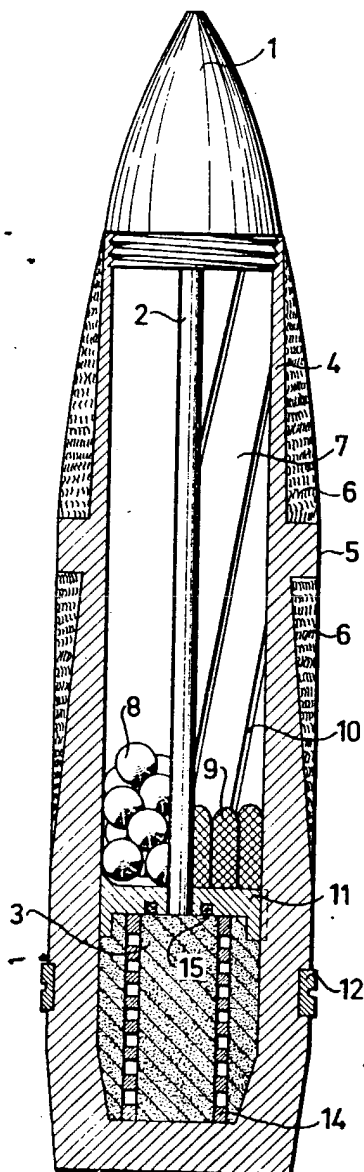
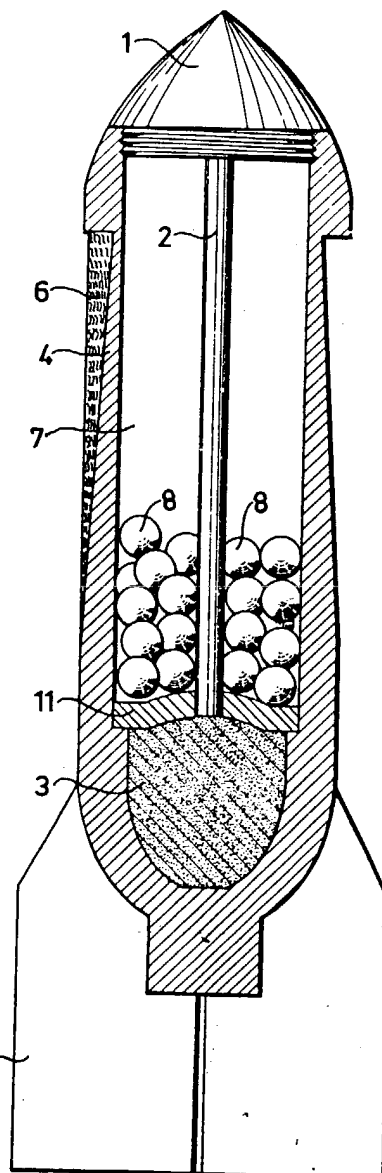


Fig. 2



PATENT SPECIFICATION

DRAWINGS ATTACHED

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COMPLETE SPECIFICATION

A Projectile or Aerial Bomb

We, FORSVARETS FABRIKSVVERK, a Swedish Government Office of Eskilstuna, Sweden, do hereby declare the invention for which we pray that a patent may be granted to us and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to projectiles and aerial bombs for action on resistant targets at great range.

Present day projectiles intended for use against highly resistive targets are designed to be effective on a direct hit, the result being that due to the low percentage of direct hits their effectiveness against highly-resistive targets at long ranges can not be relied upon with certainty. With larger projectiles a certain degree of effectiveness can be expected even if the point of impact is only a short distance from the target, but even in this case the probability of causing effective damage is slight.

The object of the present invention is to remedy this serious disadvantage and to create possibilities of achieving highly effective results with a high degree of accuracy against resistive targets at long range.

In order to obtain sufficient accuracy at long ranges the projectile ("mother projectile") must be provided with a large number of small projectiles (sub projectiles) which are given such a design and velocity that the desired effect is obtained when they strike the target. The most difficult problem is to impart sufficient velocity to the sub projectiles at long distances from the firing point, since their velocity on impact must be relatively high in order to obtain the required effect.

The remaining velocity of the sub projectiles is created from the trajectory-velocity V_D m/sec. at which the mother projectile travels and which is relatively high even at long dis-

tances from the firing point, (with, for example, a 15 cm. Howitzer having an initial velocity of 650 m/s, V_D is, even over the longest ranges (12—16 km) > 300 m/s), but far from sufficient to provide the sub projectiles with sufficient penetrating force. In non-explosive-charged projectiles provided with sub-projectiles, so-called shrapnels, commonly used against personnel the sub-projectiles are often given, by means of a small charge (usually black powder), a low booster velocity V_i 100 m/s but the main purpose of this charge is to rupture the mother projectile so that the sub-projectiles, occupying all available space within the same are released. The penetrating force imparted to the sub-projectiles in this way is not sufficient to cause the required penetrating effect.

The projectile or aerial bomb according to the present invention is characterised in that it is designed as a rifled or smooth bore firing tube and has a rear chamber for a propellant charge separated from said firing tube by means of a propelling disc, and that sub-projectiles, which have a density of at least 13 Kg, per cubic decimeter occupy at the most the rear two thirds of the volume of the firing tube, suitably approximately one fifth.

By designing the mother projectile as a firing tube for discharging the sub-projectiles and adapting the rear portion of said firing tube to form a chamber for the propellant charge, said chamber being charged for the propellant charge, said chamber being charged with a relatively large propelling charge of chemical powder having a high calorific value suitably greater than 1000 kcal/Kg, and the forward portion (main portion) as a barrel in which only a portion of the rear space of the barrel is filled with sub-projectiles, significantly greater and fully sufficient velocities, V_i 300 m/s can be imparted to said sub-

[Price 4s. 6d.]

projectiles. The weight of the mother projectile can be kept low, this is important in attaining the highest velocity V_D possible, by conveniently proportioning the outer shape with respect to the pressure ratios in the firing tube of the projectile. The contours of the projectile can be streamlined suitably with a low-density material, to obtain a shape favourable from the aerodynamic point of view. As a projectile, it has an annular bead made of material usual for projectiles.

The sub-projectiles are manufactured of heavy or hard metal having a density of at least 13 Kg per cubic decimeter and preferably have a spherical shape. Several other forms of sub-projectiles are conceivable. Further the mother projectile, for the purpose of discharging the sub-projectiles, is provided inter alia with a fuse which causes the mother projectile in a manner known *per se* to air burst at some suitable point in its trajectory. In certain cases it may also be suitable to cause the propelling disc, arranged between the charging chamber and the firing tube to rotate in said firing tube by rifling the same, and also to provide the fuse with a device which, at some suitable moment, releases the mouth of the firing tube of the projectile. The sub-projectiles are held secure in the firing tube by means of a filler, or in some other suitable way.

The invention is hereinafter more fully described with reference to two embodiments illustrated in the accompanying drawing in which Fig. 1 shows an axial longitudinal section of a shell and Fig. 2 shows the same view of an aerial bomb.

The reference numeral 1 in Figs. 1 and 2 indicates a fuse (time or proximity fuse) which is connected by means of a flash tube 2, to a chamber formed in the rear portion of the projectile and containing a propellant charge 3 which is ignited when the fuse is actuated. The reference numeral 7 indicates the firing tube formed within the wall 4 of the projectile which is exteriorly dimensioned with respect to the pressure ratios in the tube, but such that the annular bead 5 of the projectile in Fig. 1 and the forward portion of the aerial bomb in Fig. 2 retain their full dimensions. In this way a significant saving in weight can be achieved but to obtain in spite of this a good aerodynamic shape the contour of the missile, the removed material of the projectile is replaced by a suitable filling mass 6 of lower density than that of the material of the firing tube 4. The tube 7 is cylindrical having a calibre at 0.4 times the calibre of the projectile, and a length of at least twice its own calibre. Under certain circumstances the firing tube can also be designed slightly conical in either direction. The sub-projectiles are suitably balls 8 or cylinders 9 held fast in the tube in the projectile by

means of a suitable mass (not shown). In the case of sub-projectiles 9 it may be suitable to provide the firing tube with rifling 10 when a propelling disc 11, mounted between the charge chamber and the sub-projectiles, is provided with corresponding recesses. The sub-projectiles do not occupy more than the rear two thirds of the volume of the firing tube. The reference numeral 12 indicates the driving band of the projectile and 13 the vanes of the aerial bomb. The numeral 14 indicates a perforated cylindrical support required in the embodiment shown in Fig. 1, to support the propelling disc and sub-projectiles when the mother projectile is fired. The reference numeral 15 indicates a tracer composition.

WHAT WE CLAIM IS:—

1. A projectile or aerial bomb intended for use against highly resistive targets, characterized in that it is designed as a firing tube with a rifled or smooth bore and has a rear chamber for a propellant charge separated from said tube by means of a propelling disc, and that sub-projectiles, which have a density of at least 13 Kg per cubic decimeter, occupy at most the rear two thirds of the volume of such tube, suitably approximately one fifth.
2. A projectile as claimed in claim 1, characterized in that it is exteriorly dimensioned with respect to the internal pressure ratios and that material removed in so shaping said projectile is replaced with a material of lower density to make up its streamline shape.
3. A projectile as claimed in claim 1 or claim 2, characterized in that the calibre of the firing tube is at least 0.4 times the calibre of the mother projectile.
4. A projectile as claimed in any of the preceding claims, characterized in that the length of the firing tube is at least twice its calibre.
5. A projectile as claimed in any of the preceding claims, characterized in that the propellant charge is a chemical powder of high calorific value, suitably greater than 1000 kcal/kg.
6. A projectile as claimed in any of the preceding claims, characterized in that the firing tube is cylindrical or slightly conical.
7. A projectile as claimed in any of claims 1—6, characterized in that the sub-projectiles are balls.
8. A projectile as claimed in any of claims 1—6, characterized in that the sub-projectiles are constituted by cylinders.
9. A projectile as claimed in claims 1 and 6, characterized in that the sub-projectiles are rotated due to the rotation of the mother projectile and in the case where the bore of the firing tube is rifled also through the rotation of the propelling disc.
10. A projectile or aerial bomb substantially as hereinbefore described with reference to

Figs. 1 and 2 respectively of the accompanying drawings.

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